REMARKS

Claims 1 to 20 are pending in the application. The disclosure has been objected to for using attorney docket numbers instead of application numbers. Claims 1, 2, 4, 8, 12 to 14, and 16 stand rejected under 35 U.S.C. §102(b) as being anticipated by Takazawa et al. (U.S. Patent 5,279,655). Claim 3 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of Nishizaki et al. (U.S. Patent 6,022,910). Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of Tobias (U.S. Patent 5,286,288). Claim 9 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of Ball (U.S. Patent 4,684,956). Claims 10 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of Yaegashi et al. (U.S. Patent 5,270,730), Wickramanayake (U.S. Patent 5,531,816), Malhotra et al. '117 (U.S. Patent 5,922,117), and Schwartz et al. (U.S. Patent 4,468,255). Claim 15 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of Shawcross et al. (U.S. Patent 6,028,180) and Bruder et al. (U.S. Patent 5,015,292). Claim 17 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Takazawa et al. in view of JP 6 228 476, Malhotra et al. '492 (U.S. Patent 5,876,492), Malhotra et al. '995 (U.S. Patent 5,931,995), Yaegashi et al., and Malhotra et al. '390 (U.S. Patent 5,902,390). Claims 1 to 5, 7 to 9, 13, and 18 to 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breton et al. (U.S. Patent 6,045,607) in view of Takazawa et al., Ball, and Fujioka (U.S. Patent 5,397,388). Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and

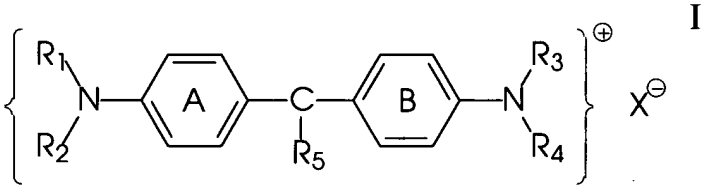
Fujioka and further in view of Tobias et al. Claims 10 to 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka and further in view of Yaegashi et al.), Wickramanayake, Malhotra et al. '117, and Schwartz et al. Claims 16 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka and further in view of JP 06228476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and Malhotra et al. '390.

With respect to the objection to the disclosure, Applicant has amended the specification as indicated to replace Attorney Docket Numbers with U.S. Application Serial Numbers, thereby eliminating this basis for objection.

Applicant respectfully traverses the rejections of the claims. The present invention is directed to an ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber. Advantages of the present invention include suitability for use in acoustic ink printing processes, desirable conductivity values, desirable melting point values, melt viscosities at jetting temperatures that enable high quality ink jet printing, generation of images with excellent hardness values, change from a solid state to a liquid state in a desirably rapid period of time upon heating, desirable acoustic loss values for acoustic ink printing, desirable conductivity values for electric field assisted

acoustic ink printing, generation of images with desirably low haze values, generation of images with good crease resistance, generation of images with high gloss, high solubility of dye colorants in the inks, thereby enabling prints with desirably high optical density using smaller amounts of the ink, and enabling thinner images of the ink on the substrate, generation of images with excellent scratch resistance, and other advantages as set forth in the specification and illustrated in the working examples.

The Examiner has rejected claims 1, 2, 4, 8, 12 to 14, and 16 under §102(b) as being anticipated by Takazawa et al. Takazawa et al. discloses a printer ink composition containing a triphenylmethane dye or a lake pigment derived therefrom as a coloring agent, including as the coloring agent a triphenylmethane dye having general formula (I):



I

wherein R_1, R_2, R_3, and R_4 are independently a hydrogen atom, an alkyl group, an aralkyl group, or an aryl group, R_5 is an aryl group, X^- is a counter ion, and ring A or ring B may be substituted by one or more substituents, provided that at least one group among R_1, R_2, R_3, and R_4 is not methyl and in the case that R_5 is p-dimethylaminophenyl, at least one of R_1 and R_2 and at least one of R_3 and R_4 are not methyl; or a lake pigment derived therefrom, in order to prevent the formation of Michler's ketone. The ink composition is used for printing media for printer such as

fabric ink ribbon, ink roll, ink-retaining element, thermal transfer ink ribbon, and pressure-sensitive transfer ink ribbon.

The Examiner has stated that this reference discloses a hot melt ink having a melting point of 50 to 150°C wherein the ink contains polystyrene, 10 to 20 percent dispersant, 10 to 40 percent colorant such as dyes, 20 to 30 percent aromatic viscosity modifier, and 20 to 60 percent ink vehicle, that although there is no explicit disclosure that the polystyrene functions as a hardening component, given that the resins are identical to those presently claimed, it is clear that polystyrene functions inherently as a hardening component, and that although there is no explicit disclosure of the time required to change the ink from a solid state to a liquid state, given that the reference ink and the presently claimed ink have almost identical melting temperatures, it is clear that the reference ink will inherently change from solid to liquid in the same amount of time as presently claimed. The Examiner is of the position that this reference anticipates claims 1, 2, 4, 8, 12 to 14, and 16.

Applicant disagrees with this position. Takazawa et al. is primarily directed to a specific colorant, and discloses the use of this colorant in various types of materials, including liquid inks, thermal transfer ribbons, and pressure sensitive transfer ribbons. The description of liquid inks, from column 6, line 41 to column 7, line 55, teaches inks containing the colorant, a non-volatile oily dissolution medium for the colorant, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent, with examples of viscosity adjusting agents being mineral oils such as motor oil, synthetic oils such as olefin-polymerized oil, diester oils such as dioctyl phthalate, dioctyl sebacate, di(1-ethylpropyl)

sebacate, dioctyl azelate, dioctyl adipate, and the like, and silicone oils. The portions of the reference referred to by the Examiner at column 6, lines 46 to 50 (mentioning a dissolution medium for the dye or a dispersion medium for the pigment as a main component, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent) and at column 7, lines 20 to 29 (mentioning component amounts of coloring agent 10 to 40 percent by weight, dye dissolution or pigment dispersion medium 20 to 60 percent by weight, pigment dispersing agent 0 to 40 and preferably 10 to 20 percent by weight, and viscosity adjusting agent 0 to 40 and preferably 20 to 30 percent by weight) refer to the liquid ink embodiment. The description of solid inks for thermal transfer and pressure sensitive transfer ink ribbons mentions, at column 8, lines 1 to 23, that the vehicle is composed of a wax-like substance or a mixture of a wax-like substance and a thermoplastic resin, with examples of the thermoplastic resin including ethylene-vinyl acetate copolymer, petroleum resin, polyvinyl acetate, polystyrene, styrene-butadiene copolymer, and acrylic resin. At column 8, lines 32 to 33, the reference states that the ink composition preferably has a melting or softening temperature of about 50° to about 150°C. Nothing in this reference, however, teaches or suggests a solid ink, or a hot melt ink, or a phase change ink, that contains a nonpolymeric aromatic viscosity modifier. Accordingly, Applicant is of the position that the present invention as cited in claims 1, 2, 4, 8, 12 to 14, and 16 is patentable with respect to this reference.

Applicant also directs the Examiner's attention to claim 8, which recites that the styrene polymer or terpene polymer hardening

component is poly (α-methyl styrene), poly (vinyl toluene-co-α-methyl styrene), poly (methyl styrene-co-indene) hydrogenated, poly (styrene-co-allyl alcohol), polylimonene, poly-β-pinene, poly(coumarone-co-indene), or mixtures thereof. Nothing in Takazawa et al. teaches or suggests a hot melt ink containing these materials. Accordingly, Applicant is of the position that this claim is particularly in condition for allowance with respect to this reference.

The Examiner has stated that "although there is no explicit disclosure (in this reference) of the time required to change the ink from a solid state to a liquid state, given that the reference ink and the presently claimed (ink) have almost identical melting temperatures, it is clear that the reference ink will inherently change from solid to liquid in the same amount of time as presently claimed." Applicant disagrees with this position. The melting point of a substance and the amount of time required for that substance to change from a solid to a liquid at the melting point are two entirely different characteristics of the substance. Nothing in Takazawa et al. teaches or suggests a hot melt ink that undergoes, upon heating, a change from a solid state to a liquid state in a period of no more than about 100 milliseconds. Accordingly, Applicant is of the position that claim 4 is also particularly in condition for allowance with respect to this reference.

The Examiner has also rejected claim 3 under §103 as being unpatentable over Takazawa et al. in view of Nishizaki et al. Nishizaki et al. discloses a hot melt solid ink composition comprising at least one polyamide and at least one terpene resin. The terpene resin is present in an amount of from 0.5 percent by weight to 15 percent by

weight based on the total weight of the ink composition. This hot melt solid ink composition can be stable to heat upon recording using ink jet recording apparatus where ink is heated to melt at a temperature higher than ordinary temperature to make a record, and has a superior transparency and a superior adhesion to printing mediums.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of melt viscosity, that Takazawa et al. discloses the use of viscosity modifiers but does not explicitly disclose the melt viscosity of the ink, that Nishizaki et al., which is drawn to hot melt inks, discloses that the melt viscosity of hot melt inks must be adjusted to range from 10 centipoise to 60 centipoise to prevent faulty ejection and clogging of the ink jet printer heads, and that it would have been within the skill level of one of ordinary skill in the art to adjust the viscosity of the hot melt ink of Takazawa et al. to values, including those presently claimed, to prevent faulty ejection and clogging of the ink jet printer heads and thereby arrive at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV

absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Nishizaki et al., fails to render obvious the present invention as recited in claim 3. Nishizaki et al. teaches a hot melt ink containing a polyamide resin and a terpene resin, and teaches that the ink has a melt viscosity of from 10 cps to 60 cps. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a melt viscosity at jetting temperature of no higher than about 25 centipoise. Accordingly, Applicant is of the position that the present invention as recited in claim 3 is patentable with respect to these references.

The Examiner has also rejected claim 6 under §103 as being unpatentable over Takazawa et al. in view of Tobias et al. Tobias et al. discloses a hot melt ink composition for use in continuous ink jet printing comprising an electrolyte, an electrolyte-solvating and dissociating compound, and an image-forming agent, said ink being solid at about 25°C, said ink liquefying at a temperature between 75°C and 175°C, and said ink in the liquid stage having a conductivity of greater than about 100 microsiemens/cm.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in

the claims of conductivity, that Tobias et al., which is drawn to hot melt inks, discloses the use of conductivity agents to control the conductivity of the ink from 500 to 1500 microsiemens per centimeter or approximately 5.7 to 6.2 log(picomho/cm), which ensures that the ink has sufficient conductivity to be successfully ink jet printed, and that it would have been obvious to one of ordinary skill in the art to control the conductivity of the hot melt of Takazawa et al. via the conductivity agents to produce an ink suitable for ink jet printing and thereby arrive at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Tobias et al., fails to render obvious the present invention as recited in claim 6. Tobias et al. teaches a hot melt ink containing an electrolyte and an electrolyte solvating and dissociating compound for use in continuous ink jet printing. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a

nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a conductivity of no less than about 6 log(picomho/cm). Accordingly, Applicant is of the position that the present invention as recited in claim 6 is patentable with respect to these references.

The Examiner has also rejected claim 9 under §103 as being unpatentable over Takazawa et al. in view of Ball. Ball discloses a process for applying a thermoplastic image forming composition as a series of discrete droplets from a non-contact ink jet printing apparatus to form separate drops on a substrate moving relative to the apparatus, characterized in that the molten composition is thermally stable at the temperature of application and is applied at a temperature in excess of 100°C. The process can be used to apply the molten composition to a variety of substrates using on-demand or continuous non-contact ink jet application techniques. However, the process is of especial use in the application of thermoplastic inks to non-porous substrates using an on-demand ink jet printer.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of the amount of polystyrene, that Ball, which is drawn to hot melt inks, discloses the use of 25 to 55 percent polystyrene to enhance the adhesion of the ink to the substrate, and that in light of the motivation for using specific amount of polystyrene disclosed by Ball as described

above, it would have been obvious to one of ordinary skill in the art to use polystyrene in this amount in the hot melt ink of Takazawa et al. to produce an ink with enhanced substrate adhesion, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Ball, fails to render obvious the present invention as recited in claim 6. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that contained the styrene polymer or terpene polymer hardening component in an amount of no less than about 0.5 percent by weight of the ink and no more than about 28 percent by weight of the ink.

Accordingly, Applicant is of the position that the present invention as recited in claim 9 is patentable with respect to these references.

The Examiner has also rejected claims 10 and 11 under §103 as being unpatentable over Takazawa et al. in view of Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Schwartz et al.

Yaegashi et al. discloses a normally solid recording material that is heat-melted in a path defined by a nozzle leading to an ejection outlet and is imparted with a thermal energy from a heater corresponding to a recording signal to generate a bubble. As a result, a droplet of the recording material is ejected out of the ejection outlet under the action of the bubble while the bubble is caused to communicate with ambience. The normally solid recording material preferably contains a colorant, a first heat-fusible solid substance having a melting point Tm of 36°-150°C and a boiling point Tb of 150°-370°C, and a second heat-fusible solid substance having a melting point Tm and a solidifying point Tf satisfying a relationship of Tm-Tf≤30°C. The distance between the heater and the ejection outlet, the sectional size of the nozzle and the thermal energy imparted by the heater are controlled to cause the bubble to communicate with ambience.

Wickramanayake discloses bleed control and fast dry times in pigment-based ink-jet ink compositions by formulating the ink compositions to include at least one appropriately modified pigment in a water-insoluble organic compound, which is microemulsified with an amphiphile and water. The pigment-based ink jet ink compositions are bleed-free and fast-drying and exhibit the inherent waterfastness of pigments. Moreover, the use of a modified pigment improves print

quality by passivating the pigment particles to eliminate agglomerations between the particles and by providing pigment particles of substantially uniform size, thereby yielding more uniform thickness and coverage on a print medium. The pigment-based ink jet ink compositions offer the best qualities of pigments as colorants while reducing or eliminating the problems conventionally associated therewith.

Malhotra et al. '117 discloses an ink composition comprising (1) a liquid alcohol vehicle, (2) a solid alcohol compound, (3) a quaternary compound, (4) a lightfastness UV absorber, (5) a lightfastness antioxidant, and (6) a colorant.

Schwartz et al. discloses improvement of the flow and handling characteristics of arylide yellow and orange pigment dispersions by incorporating in them a small amount of a rheology modifier that is the product obtained by reacting an arylide yellow or orange pigment with a primary diamine and a glycidyl ether.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of specific type of viscosity modifier, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting, that Wickramanayake, which is drawn to ink jet inks, discloses the use of phenanthrene as a solvent for the colorant and to prevent crust formation and nozzle clogging in the printer and that although there is no disclosure of other specific types of phenanthrene one of ordinary skill in the art would have recognized that the broad disclosure of

phenanthrene encompasses the use of specific types of phenanthrene such as those presently claimed and that the choice of these specific types of phenanthrene would have been within the bounds of routine experimentation, that Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images, that Schwartz et al., which is drawn to ink compositions, discloses the use of rheology modifiers such as biphenyl and biphenylene to reduce the viscosity of the colorant dispersion and to produce a softer and more workable ink, that although there is no disclosure of other specific types of biphenyl, one of ordinary skill in the art would have recognized that the broad disclosure of biphenyl encompasses the use of specific types of biphenyl such as those presently claimed, and that the choice of these specific types of phenanthrene (sic) would have been within the bounds of routine experimentation, and that in light of the motivation for using dibenzofuran, biphenyls, phenanthrene, and 1-adamantane ethanol disclosed by Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Schwartz et al., it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce a workable ink with excellent dischargeability, storeability, little blotting, which minimizes energy use with regards to the printer and does not clog the printer nozzles, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14,

and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Schwartz et al. fails to render obvious the present invention as recited in claims 10 and 11.

In addition, Applicant points out that Wickramanayake is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Further, Applicant points out that Schwartz et al. is directed to pigment dispersions for use in printing inks, paints, and plastics. These arylide pigment dispersions are treated with rheology modifiers that are derived from the arylide pigments. The portion of the reference to which the Examiner has referred, namely column 2, lines 1 and 2, is part of a disclosure that begins at column 1, line 40, and is directed to a specific structural formula for a rheology modifier derived from monoarylide yellow pigments, wherein a variable "X" group within the structure can be, among others, a biphenylene group. One of

ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Additionally, Applicant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. Dibenzofuran and 4-methylbiphenyl are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that these materials, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as viscosity modifiers to modify the viscosity of the molten ink.

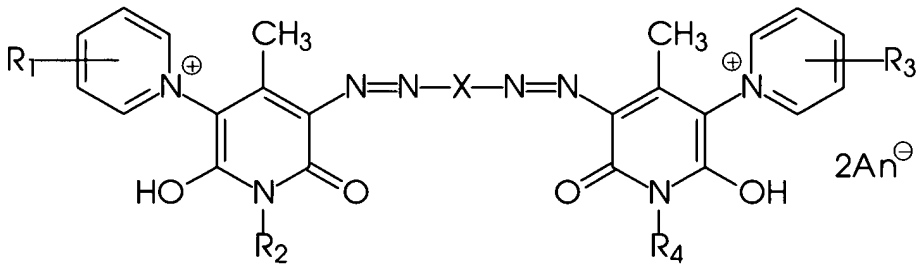
Applicant also points out that while Malhotra et al. '117 teaches an ink containing 1-adamantane ethanol, nothing in this reference teaches or suggests that this material, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as a viscosity modifier to modify the viscosity of the molten ink.

For these additional reasons, Applicant is also of the position that Takazawa et al., viewed either alone or in combination with Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Schwartz et al. fails to render obvious the present invention as recited in claims 10 and 11.

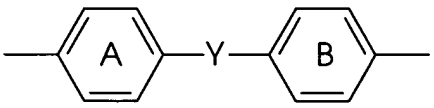
The Examiner has also rejected claim 15 under §103 as being unpatentable over Takazawa et al. in view of Shawcross et al. and Bruder et al.

Shawcross et al. discloses an ink comprising water, a water-dissipatable polymer, and one or more dyes having a benzene ring carrying a hydroxy group at each of the 1-, 3-, and 5-positions and an azo group at each of the 2-, 4-, and 6-positions or a tautomer thereof. Also claimed are certain dyes, compositions printer cartridges and ink jet printers.

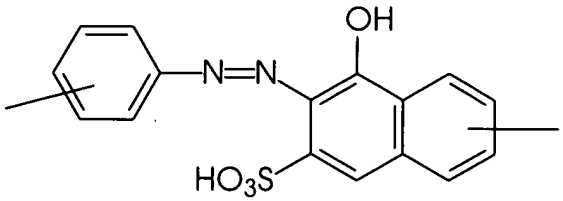
Bruder et al. discloses a recording fluid for the ink jet process that contains a water-miscible organic solvent and a dye of the formula



where R_1, R_2, R_3, and R_4 each have specified meanings, An^- is an anion, and X is a bridge member of the formula



or



where Y and the rings A and B each have specified meanings.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of a specific type of ink vehicle, that Bruder et al., which is drawn to ink jet inks, discloses the use of solvents such as carboxamide to enhance waterfastness and smear resistance, that Shawcross et al., which is drawn to ink jet inks, discloses the use of solvent such as tetrahydronaphthalene, that Shawcross et al. and Bruder et al. broadly disclose tetrahydronaphthalene and carboxamide, respectively, that although there are no specific examples of tetrahydronaphthalenes and carboxamides in either of these references, one of ordinary skill in the art would have recognized that the broad disclosure of tetrahydronaphthalene and carboxamide encompasses the use of specific types of tetrahydronaphthalene and carboxamide such as those presently claimed, and that the choice of these specific types of tetrahydronaphthalene and carboxamide would have been within the bounds of routine experimentation, and that in light of the motivation for using specific types of ink vehicles disclosed by Shawcross et al. and Bruder et al., it would have been obvious to one of ordinary skill in the art to use these ink vehicles as the vehicle in the ink of Takazawa et al. to produce an ink with enhanced waterfastness and smear resistance.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Shawcross et al. and/or Bruder et al. fails to render obvious the present invention as recited in claim 15.

In addition, Applicant points out that Shawcross et al. and Bruder et al. are directed to liquid ink jet ink compositions. One of ordinary skill in the art would not gain, from a reading of these references, an understanding that the specific ink vehicles recited in claim 15 of the instant application would be suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Applicant points out that Bruder et al.'s general description of "carboxamides, such as N,N-dimethylformamide or N,N-dimethylacetamide" fails to teach or suggest a specific material such as 4-bromo-N-dodecyl-1-hydroxy-2-naphthalene carboxamide, having an acoustic-loss value of 42 decibels per millimeter and a melting point of 96°C, and that Shawcross et al.'s general description of "water-immiscible organic solvents include aromatic hydrocarbons, e.g. toluene, xylene,

naphthalene, tetrahydronaphthalene and methyl naphthalene" fails to teach or suggest a specific material such as 1,5-dihydroxy-1,2,3,4-tetrahydronaphthalene. One important distinction is that N,N-dimethylformamide, N,N-dimethylacetamide, and tetrahydronaphthalene are all liquids at room temperature, whereas 4-bromo-N-dodecyl-1-hydroxy-2-naphthalene carboxamide has a melting point of 95 to 97°C and 1,5-dihydroxy-1,2,3,4-tetrahydronaphthalene has a melting point of 132 to 134°C.

For these additional reasons, Applicant is also of the position that Takazawa et al., viewed either alone or in combination with Bruder et al. and/or Shawcross et al. fails to render obvious the present invention as recited in claim 15.

The Examiner has also rejected claim 17 under §103 as being unpatentable over Takazawa et al. in view of JP 6 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and Malhotra et al. '390.

JP 6 228 476 discloses a recording liquid obtained by adding a solvent such as isopropyl alcohol, thiodiglycol, or 2-pyrrolidone and ion exchange water to at least one of phthalocyanine, xanthene, triphenylmethane, anthraquinone, monoazo, disazo, trisazo, and tetraazo-based dyes or a pigment, stirring and mixing the resultant mixture, preparing a recording liquid, and further blending the prepared recording liquid with 2-oxazolidone. The recording liquid has good humectant properties, discharge stability, and resistance of a member to the recording liquid and high solubility in dyes without causing a bronze

phenomenon in printed letters, and is capable of providing clear images having high image density and useful for ink jet recording.

Malhotra et al. '492 discloses an ink comprising (1) a liquid ester vehicle, (2) a solid ester compound, (3) a liquid crystalline ester compound, (4) a UV absorber, (5) an antioxidant, and (6) a colorant.

Malhotra et al. '995 discloses an ink comprising (1) a liquid aldehyde, a liquid acid, or mixtures thereof, (2) a solid additive aldehyde compound, a solid additive acid compound, or mixtures thereof, (3) a lightfastness UV absorber, (4) a lightfastness antioxidant, and (5) a colorant.

Malhotra et al. '390 discloses an ink comprising (1) a liquid ketone, (2) a solid ketone, (3) a lightfastness UV absorber, (4) a lightfastness antioxidant, and (5) a colorant.

The Examiner has stated that the difference between Takazawa et al. and the present claimed invention is the requirement in the claims of a specific type of dispersing agent, that the abstract of the Japanese reference discloses the use of 2-oxazolidone to produce an ink with excellent humectant properties and discharge stability, that Malhotra et al. '492, which is drawn to hot melt inks, discloses the use of butyrolactone to control the acoustic loss value of the ink, that Malhotra et al. '995, which is drawn to hot melt inks, discloses the use of benzaldehyde and cinnamaldehyde to control the acoustic loss value of the ink, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione to produce an ink with

excellent dischargeability, storability, and little blotting, that Malhotra et al. '390, which is drawn to hot melt inks, discloses the use of cyclohexanone and cyclohexanedione to control the acoustic loss value of the ink, that Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and Malhotra et al. '390 broadly disclose butyrolactones, benzaldehydes, cinnamaldehydes, glutaric acids, cyclohexanone, and cyclohexanedione, respectively, that although there are no specific examples of these compounds in the references one of ordinary skill in the art would have recognized that the broad disclosure of butyrolactone, benzaldehyde, cinnamaldehyde, glutaric acid, cyclohexanone, and cyclohexanedione encompasses the use of specific types of these compounds such as those presently claimed, and that the choice of these specific types would have been within the bounds of routine experimentation, that Malhotra et al. '995 discloses 2-hydroxybenzaldehyde while the present claims require either 3-hydroxybenzaldehyde or 4-hydroxybenzaldehyde, that Yaegashi et al. discloses 2,3-dimethoxybenzaldehyde while the present claims require 2,6-dimethoxybenzaldehyde, that in each case the only difference between the reference compounds and those presently claimed are the position of the substituents and one of ordinary skill in the art would expect the hydroxybenzaldehyde or dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents, and that in light of the motivation of using 2-oxazolidone, butyrolactone, benzaldehyde, cinnamaldehyde, 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione, cyclohexanone, and cyclohexanedione disclosed by these references, it

would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce an ink with suitable acoustic loss value, excellent humectant properties, and discharge stability, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1, 2, 4, 8, 12 to 14, and 16 under §102 as being unpatentable over Takazawa et al., Takazawa et al. fails to teach or suggest a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component,. (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber; accordingly, Applicant is of the position that this reference, viewed either alone or in combination with JP 6 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and/or Malhotra et al. '390 fails to render obvious the present invention as recited in claim 17.

In addition, Applicant points out that, based on the abstract provided, JP 6 228 476 is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific colorant dispersing agents recited in claim 17 of the instant application would be suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Applicant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible

solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. 2,3-Dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that 2,6-dimethoxybenzaldehyde, diphenyl carbonate, 2,2-dimethyl glutaric acid, 3,3-dimethylglutaric acid, 1-(2-hydroxyphenyl)-3-phenyl-1,3-propanedione, or 1-(2-hydroxy-5-methylphenyl)-3-phenyl-1,3-propanedione, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as colorant dispersing agents. With respect to the Examiner's comment that "one of ordinary skill in the art would expect the . . . dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents," Applicant points out that 2,3-dimethoxybenzaldehyde has a melting point of 48 to 52°C and a boiling point of 137°C, whereas 2,6-dimethoxybenzaldehyde has a melting point of 96 to 98°C and a boiling point of 285°C; these materials could be expected by one of ordinary skill in the art to behave differently in a hot melt ink.

Additionally, Applicant points out that Malhotra et al. '492 at column 5, lines 5 to 7 teaches γ-butyrolactone as an example of the liquid ester vehicle of the ink disclosed therein; γ-butyrolactone is a liquid at room temperature. In contrast, γ-(2-naphthyl)-γ-butyrolactone has a melting point of 119 to 121°C and diphenyl-γ-butyrolactone has a melting point of 77 to 79°C. Accordingly, this teaching in Malhotra et al.

'492 cannot be said fairly to teach or suggest the use of γ-(2-naphthyl)-γ-butyrolactone or diphenyl-γ-butyrolactone in solid inks.

Applicant also points out that Malhotra et al. '995 at column 6, line 60 to column 7, line 19 teaches benzaldehyde, cinnamaldehyde, and 2-hydroxybenzaldehyde as examples of the liquid aldehyde vehicle of the ink disclosed therein; benzaldehyde, cinnamaldehyde, and 2-hydroxybenzaldehyde are all liquids at room temperature. In contrast, 3-hydroxybenzaldehyde has a melting point of 103 to 105°C and 4-hydroxybenzaldehyde has a melting point of 117 to 119°C. Accordingly, this teaching in Malhotra et al. '995 cannot be said fairly to teach or suggest the use of 3-hydroxybenzaldehyde or 4-hydroxybenzaldehyde in solid inks.

Applicant in addition points out that Malhotra et al. '390 at column 1, lines 37 and 42 to 43 and column 5, line 7 teaches 4-ethylcyclohexanone and 2-acetylcyclohexanone as examples of the liquid ketone vehicle of the ink disclosed therein. While the reference further teaches at column 5, line 13 1,2-cyclohexanedione as an example of the solid ketone component of the ink disclosed therein, this teaching cannot be said fairly to teach or suggest the use of 2,6-diphenylcyclohexanone or 4,4-dimethyl-1,3-cyclohexanedione in an ink according to the present invention.

For these additional reasons, Applicant is also of the position that Takazawa et al., viewed either alone or in combination with JP 6 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and/or Malhotra et al. '390 fails to render obvious the present invention as recited in claim 17.

The Examiner has also rejected claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka.

Breton et al. discloses an ink composition containing (1) a first solid carbamate, (2) a second carbamate with a dissimilar melting point than the first solid carbamate (1), (3) a lightfastness component, (4) a lightfastness antioxidant, and (5) a colorant.

Fujioka discloses a hot melt ink for an ink jet printer which comprises 50 weight percent or more of a solid wax that is solid at normal temperatures and has a solubility parameter of not larger than 9.00, an organic substance having a solubility parameter greater than that of the solid wax, a polymer material that is miscible with at least one of the solid wax and the organic substance and which has a weight average molecular weight of not less than 500, and a coloring material. The hot melt ink exhibits good dispersability and dispersion stability of the coloring material with good heat stability and color fastness to light.

The Examiner has stated that Breton et al. discloses a hot melt ink possessing melting temperature of 60 to 150°C, melt viscosity of less than 10 centipoise, acoustic loss value of 5 to 40 decibels per millimeter, haze value of 10 to 30, wherein the ink changes from solid to liquid in about 1 to 100 milliseconds, said ink containing a colorant such as a dye, antioxidant, and UV absorber, that this reference also discloses an acoustic ink jet printing process, and that the difference between Breton et al. and the present claimed invention is the requirement in the claims of (a) styrene or terpene resin and (b) aromatic viscosity modifier.

The Examiner has stated with respect to difference (a) that Takazawa et al., which is drawn to hot melt inks, discloses the use of polystyrene to produce a solid ink, that Ball, which is drawn to hot melt inks, discloses the use of 22 to 55 percent polyterpenes and methyl styrenes to enhance the adhesion of the ink to the substrate, that Fujioka, which is drawn to hot melt inks, discloses the use of 0.1 to 48 percent terpene resins and cumarone-indene resins to provide the ink high transparency, controlled hardness, and good wear resistance, that although Takazawa et al., Ball, or Fujioka do not explicitly disclose that the styrene/terpene resins function as hardening components, given that the resins are identical to those presently claimed, it would be natural for one of ordinary skill in the art to infer that these reference styrene/terpene resins intrinsically function as hardening components, and that in light of the motivation for using styrene/terpene resin disclosed by Takazawa et al., Ball, and Fujioka, it would have been obvious to one of ordinary skill in the art to use these resins in the hot melt ink of Breton et al. to produce a solid ink that has enhanced substrate adhesion, ink high transparency, controlled hardness, and good wear resistance, thereby arriving at the claimed invention. With respect to difference (b), the Examiner has stated that Takazawa et al. discloses the use of aromatic viscosity modifiers to control the viscosity of the ink so that the printer nozzles are not clogged. The Examiner is of the position that in light of the motivation for using viscosity modifier disclosed by Takazawa et al., it would have been obvious to one of ordinary skill in the art to use viscosity modifier in the ink of Breton et al. to produce an ink

that does not clog the printer nozzles, and thereby arrive at the claimed invention.

Applicant disagrees with this position. Applicant points out that Breton et al. discloses a completely different composition from that claimed in the instant application. As the Examiner has stated, the difference between Breton et al. and the present claimed invention is the requirement in the claims of (a) styrene or terpene resin and (b) aromatic viscosity modifier. Since, in claim 1, the mandatory ink ingredients are (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, and (c) a colorant, this statement is tantamount to conceding that the difference between Breton et al. and the present claimed invention is that Breton et al. completely fails to teach or suggest the instantly claimed invention. One of ordinary skill in the art would not be motivated to combine the teachings of Breton et al. with the other cited references to arrive at a completely different ink composition from that disclosed in Breton et al. In addition, even if these references were viewed in combination, one of ordinary skill in the art would not be enabled thereby to arrive at the instantly claimed invention. Accordingly, Applicant is of the position that this reference, viewed either alone or in combination with Takazawa et al., Ball, and/or Fujioka, fails to render obvious the present invention as recited in claims 1 to 5, 7 to 9, 13, and 18 to 20.

Takazawa et al. is primarily directed to a specific colorant, and discloses the use of this colorant in various types of materials, including liquid inks, thermal transfer ribbons, and pressure sensitive transfer ribbons. The description of liquid inks, from column 6,

line 41 to column 7, line 55, teaches inks containing the colorant, a non-volatile oily dissolution medium for the colorant, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent, with examples of viscosity adjusting agents being mineral oils such as motor oil, synthetic oils such as olefin-polymerized oil, diester oils such as dioctyl phthalate, dioctyl sebacate, di(1-ethylpropyl) sebacate, dioctyl azelate, dioctyl adipate, and the like, and silicone oils. The portions of the reference referred to by the Examiner at column 6, lines 46 to 50 (mentioning a dissolution medium for the dye or a dispersion medium for the pigment as a main component, and, if necessary, a pigment dispersing agent and a viscosity adjusting agent) and at column 7, lines 20 to 29 (mentioning component amounts of coloring agent 10 to 40 percent by weight, dye dissolution or pigment dispersion medium 20 to 60 percent by weight, pigment dispersing agent 0 to 40 and preferably 10 to 20 percent by weight, and viscosity adjusting agent 0 to 40 and preferably 20 to 30 percent by weight) refer to the liquid ink embodiment. The description of solid inks for thermal transfer and pressure sensitive transfer ink ribbons mentions, at column 8, lines 1 to 23, that the vehicle is composed of a wax-like substance or a mixture of a wax-like substance and a thermoplastic resin, with examples of the thermoplastic resin including ethylene-vinyl acetate copolymer, petroleum resin, polyvinyl acetate, polystyrene, styrene-butadiene copolymer, and acrylic resin. At column 8, lines 32 to 33, the reference states that the ink composition preferably has a melting or softening temperature of about 50° to about 150°C. Nothing in this reference, however, teaches or suggests a solid ink, or a hot melt ink, or a phase change ink, that contains a

nonpolymeric aromatic viscosity modifier. Similarly, nothing in either Ball or Fujioka teaches or suggests a hot melt ink containing (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, and (c) a colorant. Accordingly, Applicant is of the position that these references, viewed either alone or in combination with Breton et al., fail to render obvious the present invention as recited in claims 1 to 5, 7 to 9, 13, and 18 to 20.

The Examiner has also rejected claim 6 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka and further in view of Tobias et al. The Examiner has stated that the difference between Breton et al. in view of Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of conductivity, that that Tobias et al., which is drawn to hot melt inks, discloses the use of conductivity agents to control the conductivity of the ink from 500 to 1500 microsiemens per centimeter or approximately 5.7 to 6.2 log(picomho/cm), which ensures that the ink has sufficient conductivity to be successfully ink jet printed, and that it would have been obvious to one of ordinary skill in the art to control the conductivity of the hot melt of Breton et al. via the conductivity agents to produce an ink suitable for ink jet printing and thereby arrive at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention. Tobias et

al. teaches a hot melt ink containing an electrolyte and an electrolyte solvating and dissociating compound for use in continuous ink jet printing. One of ordinary skill in the art, upon viewing these references in combination, would not be led to arrive at a hot melt ink composition comprising (a) a styrene polymer or terpene polymer hardening component, (b) a nonpolymeric aromatic viscosity modifier, (c) a colorant, (d) an optional nonpolymeric aromatic ink vehicle, (e) an optional colorant dispersing agent, (f) an optional conductivity enhancing agent, (g) an optional antioxidant, and (h) an optional UV absorber, and would not be led to arrive at such an ink that had a conductivity of no less than about 6 log(picomho/cm). Accordingly, Applicant is of the position that the present invention as recited in claim 6 is patentable with respect to these references.

The Examiner has also rejected claims 10 to 12 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka and further in view of Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Schwartz et al. The Examiner has stated that the difference between Breton et al. in view of Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of specific type of viscosity modifier, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of heat fusible substances such as dibenzofuran and 4-methylbiphenyl to produce an ink with excellent dischargeability, storability, and little blotting, that Wickramanayake, which is drawn to ink jet inks, discloses the use of phenanthrene as a solvent for the colorant and to prevent crust formation and nozzle clogging in the printer and that although there is no disclosure of other

specific types of phenanthrene one of ordinary skill in the art would have recognized that the broad disclosure of phenanthrene encompasses the use of specific types of phenanthrene such as those presently claimed and that the choice of these specific types of phenanthrene would have been within the bounds of routine experimentation, that Malhotra et al. '117, which is drawn to hot melt inks, discloses the use of 1-adamantane ethanol to ensure that the ink has low acoustic loss to minimize or reduce energy consumption of the printer and to generate high quality, lightfast, and waterfast images, that Schwartz et al., which is drawn to ink compositions, discloses the use of rheology modifiers such as biphenyl and biphenylene to reduce the viscosity of the colorant dispersion and to produce a softer and more workable ink, that although there is no disclosure of other specific types of biphenyl, one of ordinary skill in the art would have recognized that the broad disclosure of biphenyl encompasses the use of specific types of biphenyl such as those presently claimed, and that the choice of these specific types of phenanthrene (sic) would have been within the bounds of routine experimentation, and that in light of the motivation for using dibenzofuran, biphenyls, phenanthrene, and 1-adamantane ethanol disclosed by Yaegashi et al., Wickramanayake, Malhotra et al. '117, and Schwartz et al., it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce a workable ink with excellent dischargeability, storeability, little blotting, which minimizes energy use with regards to the printer and does not clog the printer nozzles, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention.

In addition, Applicant points out that Wickramanayake is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Further, Applicant points out that Schwartz et al. is directed to pigment dispersions for use in printing inks, paints, and plastics. These arylide pigment dispersions are treated with rheology modifiers that are derived from the arylide pigments. The portion of the reference to which the Examiner has referred, namely column 2, lines 1 and 2, is part of a disclosure that begins at column 1, line 40, and is directed to a specific structural formula for a rheology modifier derived from monoarylide yellow pigments, wherein a variable "X" group within the structure can be, among others, a biphenylene group. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific viscosity modifiers recited in claims 10 and 11 of the instant application would be suitable materials for modifying the melt viscosity of a hot melt ink composition of the present invention.

Additionally, Applicant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. Dibenzofuran and 4-methylbiphenyl are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that these materials, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as viscosity modifiers to modify the viscosity of the molten ink.

Applicant also points out that while Malhotra et al. '117 teaches an ink containing 1-adamantane ethanol, nothing in this reference teaches or suggests that this material, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as a viscosity modifier to modify the viscosity of the molten ink.

For these additional reasons, Applicant is also of the position that Breton et al., Takazawa et al., Ball, and Fujioka, viewed in combination with Yaegashi et al., Wickramanayake, Malhotra et al. '117, and/or Schwartz et al. fail to render obvious the present invention as recited in claims 10 and 11.

The Examiner has also rejected claims 16 and 17 §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka and further in view of JP 6 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and Malhotra et al. '390. The Examiner has stated that the difference between Breton et al. in view of

Takazawa et al., Ball, and Fujioka and the present claimed invention is the requirement in the claims of a specific type of dispersing agent, that the abstract of the Japanese reference discloses the use of 2-oxazolidone to produce an ink with excellent humectant properties and discharge stability, that Malhotra et al. '492, which is drawn to hot melt inks, discloses the use of butyrolactone to control the acoustic loss value of the ink, that Malhotra et al. '995, which is drawn to hot melt inks, discloses the use of benzaldehyde and cinnamaldehyde to control the acoustic loss value of the ink, that Yaegashi et al., which is drawn to hot melt inks, discloses the use of 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione to produce an ink with excellent dischargeability, storability, and little blotting, that Malhotra et al. '390, which is drawn to hot melt inks, discloses the use of cyclohexanone and cyclohexanedione to control the acoustic loss value of the ink, that Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and Malhotra et al. '390 broadly disclose butyrolactones, benzaldehydes, cinnamaldehydes, glutaric acids, cyclohexanone, and cyclohexanedione, respectively, that although there are no specific examples of these compounds in the references one of ordinary skill in the art would have recognized that the broad disclosure of butyrolactone, benzaldehyde, cinnamaldehyde, glutaric acid, cyclohexanone, and cyclohexanedione encompasses the use of specific types of these compounds such as those presently claimed, and that the choice of these specific types would have been within the bounds of routine experimentation, that Malhotra et al. '995 discloses 2-hydroxybenzaldehyde while the present claims require either 3-

hydroxybenzaldehyde or 4-hydroxybenzaldehyde, that Yaegashi et al. discloses 2,3-dimethoxybenzaldehyde while the present claims require 2,6-dimethoxybenzaldehyde, that in each case the only difference between the reference compounds and those presently claimed are the position of the substituents and one of ordinary skill in the art would expect the hydroxybenzaldehyde or dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents, and that in light of the motivation of using 2-oxazolidone, butyrolactone, benzaldehyde, cinnamaldehyde, 2,3-dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione, cyclohexanone, and cyclohexanedione disclosed by these references, it would have been obvious to one of ordinary skill in the art to use these compounds in the hot melt ink of Takazawa et al. to produce an ink with suitable acoustic loss value, excellent humectant properties, and discharge stability, thereby arriving at the claimed invention.

Applicant disagrees with this position. As stated hereinabove with respect to the rejection of claims 1 to 5, 7 to 9, 13, and 18 to 20 under §103 as being unpatentable over Breton et al. in view of Takazawa et al., Ball, and Fujioka, these references, viewed either alone or in combination, fail to render obvious the present invention.

In addition, Applicant points out that, based on the abstract provided, JP 6 228 476 is directed to a liquid ink jet ink composition. One of ordinary skill in the art would not gain, from a reading of this reference, an understanding that the specific colorant dispersing agents recited in claim 17 of the instant application would be

suitable materials for inclusion in a hot melt ink composition of the present invention.

Further, Applicant points out that Yaegashi et al. discloses a solid ink ("recording material") that comprises a heat fusible solid substance and a colorant, and can optionally contain additives for adjusting ink properties and a normally liquid organic solvent such as an alcohol. 2,3-Dimethoxybenzaldehyde, diphenyl carbonate, glutaric acid, and 1,3-diphenyl-1,3-propanedione are listed, among many other materials, as examples of the heat fusible solid substance. Nothing in this reference teaches or suggests that 2,6-dimethoxybenzaldehyde, diphenyl carbonate, 2,2-dimethyl glutaric acid, 3,3-dimethylglutaric acid, 1-(2-hydroxyphenyl)-3-phenyl-1,3-propanedione, or 1-(2-hydroxy-5-methylphenyl)-3-phenyl-1,3-propanedione, present in a hot melt ink in combination with a styrene polymer or terpene polymer hardening component and a colorant, would act as colorant dispersing agents. With respect to the Examiner's comment that "one of ordinary skill in the art would expect the . . . dimethoxybenzaldehyde to function in the same manner regardless of the position of the substituents," Applicant points out that 2,3-dimethoxybenzaldehyde has a melting point of 48 to 52°C and a boiling point of 137°C, whereas 2,6-dimethoxybenzaldehyde has a melting point of 96 to 98°C and a boiling point of 285°C; these materials could be expected by one of ordinary skill in the art to behave differently in a hot melt ink.

Additionally, Applicant points out that Malhotra et al. '492 at column 5, lines 5 to 7 teaches γ-butyrolactone as an example of the liquid ester vehicle of the ink disclosed therein; γ-butyrolactone is a

liquid at room temperature. In contrast, γ-(2-naphthyl)-γ-butyrolactone has a melting point of 119 to 121°C and diphenyl-γ-butyrolactone has a melting point of 77 to 79°C. Accordingly, this teaching in Malhotra et al. '492 cannot be said fairly to teach or suggest the use of γ-(2-naphthyl)-γ-butyrolactone or diphenyl-γ-butyrolactone in solid inks.

Applicant also points out that Malhotra et al. '995 at column 6, line 60 to column 7, line 19 teaches benzaldehyde, cinnamaldehyde, and 2-hydroxybenzaldehyde as examples of the liquid aldehyde vehicle of the ink disclosed therein; benzaldehyde, cinnamaldehyde, and 2-hydroxybenzaldehyde are all liquids at room temperature. In contrast, 3-hydroxybenzaldehyde has a melting point of 103 to 105°C and 4-hydroxybenzaldehyde has a melting point of 117 to 119°C. Accordingly, this teaching in Malhotra et al. '995 cannot be said fairly to teach or suggest the use of 3-hydroxybenzaldehyde or 4-hydroxybenzaldehyde in solid inks.

Applicant in addition points out that Malhotra et al. '390 at column 1, lines 37 and 42 to 43 and column 5, line 7 teaches 4-ethylcyclohexanone and 2-acetylcyclohexanone as examples of the liquid ketone vehicle of the ink disclosed therein. While the reference further teaches at column 5, line 13 1,2-cyclohexanedione as an example of the solid ketone component of the ink disclosed therein, this teaching cannot be said fairly to teach or suggest the use of 2,6-diphenylcyclohexanone or 4,4-dimethyl-1,3-cyclohexanedione in an ink according to the present invention.

For these additional reasons, Applicant is also of the position that Breton et al. in view of Takazawa et al., Ball, and Fujioka,

viewed in combination with JP 6 228 476, Malhotra et al. '492, Malhotra et al. '995, Yaegashi et al., and/or Malhotra et al. '390, fail to render obvious the present invention as recited in claims 16 and 17.

In the rejections of the claims under §103, the Examiner appears to have considered various portions of the references cited, in each instance viewing the cited portion in isolation from the context of the entire reference, and combined these isolated portions to arrive at the present invention with the benefit of hindsight. Using hindsight or applying the benefit of the teachings of the present application when determining obviousness, however, is impermissible; the references applied must be reviewed without hindsight, must be reviewed as a whole, and must suggest the desirability of combining the references. Lindemann Maschinenfabrik v. American Hoist & Derrick Co., 221 U.S.P.Q. 481 (Fed. Cir. 1984). None of the cited references suggests or teaches the desirability of combining the elements of the present invention as claimed. Obviousness cannot be established by combining references to arrive at the claimed invention, absent some teaching, suggestion, or incentive supporting the combination. In re Geiger, 2 U.S.P.Q. 2d 1276 (Fed. Cir. 1987); Carella v. Starlight Archery and Pro Line Co., 804 F.2d 135, 231 U.S.P.Q. 644 (Fed. Cir. 1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. (BNA) 929 (Fed. Cir. 1984). When determining patentability under §103, the Examiner must consider the invention as a whole, and cannot view each element of the claim separately with respect to the prior art. See, e.g., Jones v. Hardy, __ F.2d __, 220 U.S.P.Q. 1021 (BNA) (Fed. Cir. 1984). When prior art references require selective combination to render obvious a subsequent invention,

there must be some reason for the combination other than the hindsight gleaned from the invention itself. Uniroyal Inc. v. Rudkin Wiley Corp., __ F. 2d __, 5 U.S.P.Q. 2d 1435 (Fed. Cir. 1988); Interconnect Planning Corp. v. Feil, 774 F. 2d 1132, 227 U.S.P.Q. 543 (Fed. Cir. 1985). It is impermissible to use the claims as a frame and the prior art references as a mosaic to piece together a facsimile of the claimed invention. Uniroyal Inc. v. Rudkin Wiley Corp., __ F. 2d __, 5 U.S.P.Q. 2d 1435 (Fed. Cir. 1988); W. L. Gore and Associates, Inc. v. Garlock, Inc., 721 F. 2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983).

Applicant directs the Examiner's attention to Ex Parte Levengood, 28 USPQ 2d 1300 (Bd. Pat. App. & Int. 1993), in which the Board reversed the rejection of all claims "because the examiner has used the wrong standard of obviousness.":

> "Obviousness is a legal conclusion, the determination of which is a question of patent law. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963). In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present evidence[1], preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art would have been led to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention. See, for example, Carella v. Starlight Archery, 804 F.2d 135, 231 USPQ 644 (Fed. Cir. 1986); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985).
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> ...
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> "...the examiner may provide an explanation based on logic and sound scientific reasoning that will support a holding of obviousness. In re Soli, 317 F.2d 941, 137 USPQ 797 (CCPA 1963)[2]...
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> ...
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> "In this case, however, the only suggestion for the examiner's combination of the isolated teachings of the applied references improperly stems from appellant's disclosure and not from the applied prior art. In re Ehrreich, 590 F.2d 902, 200 USPQ 504 (CCPA 1979). At best, the examiner's comments regarding obviousness amount to an assertion

> that one of ordinary skill in the relevant art would have been able to arrive at appellant's invention because he had the necessary skills to carry out the requisite process steps. This is an inappropriate standard for obviousness. See Orthokinetics Inc. v. Safety Travel Chairs Inc., 806 F.2d 1565, 1 USPQ 2d 1081 (Fed. Cir. 1986). That which is within the capabilities of one skilled in the art is not synonymous with obviousness. Ex Parte Gerlach, 212 USPQ 471 (Bd. App. 1980). ... That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention.
>
> "Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that 'would lead' that individual 'to combine the relevant teachings of the references.' In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). In re Newell, 891 F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."
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> 1. The importance of evidence in the examination process is set forth in the following quotation from In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984): "The Supreme Court in Graham v. John Deere Co., 383 U.S. 1, 148 U.S.P.Q. 459 (1966), focused on the procedural and evidentiary processes in reaching a conclusion under section 103. As adapted to ex parte procedure, Graham is interpreted as continuing to place the 'burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103'. In re Warner, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967). After a *prima facie* case of obviousness has been established, the burden of going forward shifts to the applicant.
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> 2. Preferably the examiner's explanation should be such that it provides that impetus necessary to cause one skilled in the art to combine the teachings of the references to make the proposed modification. In re Albrecht, 514 F.2d 1385, 185 USPQ 585 (CCPA 1975).

Applicant asserts that in the instant §103 rejections, the only suggestion for the Examiner's combination of the isolated teachings of the applied references improperly stems from Applicant's disclosure and not from the

applied prior art, and accordingly is of the position that the present invention is patentable with respect to the cited references.

Applicant believes that the foregoing amendments and distinctions place the claims in condition for allowance, and accordingly respectfully requests reconsideration and withdrawal of all grounds for rejection.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is hereby authorized to call Applicant(s) attorney, Judith L. Byorick, at Telephone Number (716) 423-4564, Rochester, New York.

Respectfully submitted,

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